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(54) Title: ELECTROPHORETIC RATCHETS AND CYCLIC ELECTROPHORESIS

(57) Abstract: Systems and methods for improving the resolution of macromolecules during electrophoresis. A method of creating an electrical field-rectifying fractionation-ratchet includes obtaining a fractionated particle that has an electrophoretic mobility that varies when an electric field varies, applying a pulsed electrical field to the fractionated particle, and varying a plurality of pulses of the electrical field repeatedly. Another method includes preparative gel electrophoresis that utilizes a continuous fractionation method made possible by an electrophoretic ratchet-generating field. Another method includes implementing cyclic electrophoresis including analyzing a sample by constant field electrophoresis; and enhancing the sample by an electrophoretic ratchet. Another method includes error checking during cyclic electrophoresis comprising: analyzing a sample by constant field electrophoresis; checking for errors in the sample; and enhancing the sample by an electrophoretic ratchet.

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